

Chapter 14

The Positive Effects of Financial Innovation on the International Trade Volume

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Abstract

Recent developments in technology and research have brought new innovations into the finance sector. Applying mathematics and computer science into finance has developed a multidisciplinary financial engineering field, where new quantitative and complex financial products are supplied to investors. In this chapter, we describe financial technologies as high-frequency trade; investment vehicles as mutual, exchange-traded, and hedge funds in the finance sector with figures of past 10 years and their impact in international trade volume. Financial derivatives are innovative products where investor may mitigate risk on their domestic and international transactions. The author also discusses cryptocurrencies as an important tool in innovation.

Keywords: Mutual funds; exchange traded funds; financial derivatives; financial innovations; strategy generation; financial technologies

14.1. Introduction

During rapid developments in technology and innovation, changes and adaptations in behaviors, big data analysis and so much more, innovations in finance sector are more important than ever. These innovations affect and form the behaviors of investors and aimed to increase the service quality in the sector. Innovation is about the acts of inventing and diffusing novel ideas, new products, or services (Rogers, 2003). In general, financial innovation is the process of

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developing and popularizing new financial products, instruments technologies, as well as new financial markets and institutions (Tufano, 2003). These innovations have promoted hi-tech capabilities, advances in financial theory, new trading, and hedging processes. Financial innovations come out from changes in the preferences of investors, and new demands, to answer rapid changes in the ecosystem and competition in the industry. If the technology and economics were in standstill, an innovation would never be a case. However, it is not like that in practice. Technology evolves faster than ever. All transactions come together and create a big data, which is an important information source to predict and strategically build future steps. These bring many opportunities into financial markets. But not every investor has time or skills to manage his/her investment solely, so they go to professionals for the management of their wealth. These needs created an industry in the finance and the industry employ and create many innovations and strategies through active management. Financial innovations lead to know market very well and deep, however it is important to keep in mind that these innovations reach to all market players almost at the same time, so everyone has the information and will take appropriate steps. Although faster communication technologies, all investors and traders should limit their risk take and avoid out-guess the market. Scenario analysis and stress tests of all projects must be carried out, and institutions should be ready for worst cases.

Advances in technology and research techniques stimulated a multidisciplinary finance field, financial engineering. It is a development and creative application of innovative financial technology. Modern financial technologies include exotic financial products, up-to-date financial theory, quantitative techniques, and financial processes (Beder & Marshall, 2011). Financial engineering applies sophisticated mathematics, computer sciences, and blockchain technologies into finance and produce exotic outputs.

In this chapter, we describe innovative financial vehicles as mutual funds, exchange-traded funds (ETFs), hedge funds; high-frequency trading (HFT), derivatives markets and briefly about financial engineering. The years ahead will be of smart technologies. We believe such innovations in financial sector will increase transparency and better serve the welfare of people.

14.2. High-Frequency Trading

One of the important innovations in financial markets is HFT. In a financial market, HFT is managed through connected supercomputers that give broker-dealers the capability to execute trades with extremely low latency that is within microseconds or milliseconds. In contrast to conventional exchanges, there is no trading floor and brokers shouting to trade. HFT traders are at a rat race with milliseconds. The minimal time to execute an order depends on some factors: the computer systems and the algorithms installed on them, the time taken for signals to transmit between the exchange and the HFT computers. HFT firms pay the exchanges to minimize the time between their computers and to enhance their computer hardware (Ladley, 2020). HFT has eliminated human intermediation in the trade and replaced by artificial traders via ultra-fast algorithms. Manahov, Hudson, and Urquhart (2018) study stock price predictability at the millisecond

level and find that HFT models are ahead of traditional models in forecasting selected company stock returns.

Amid those competitive financial markets, heterogeneous players in electronic markets, artificial intelligence, and HFT eliminate abnormal return opportunities in the shortest time, and thus contribute the efficiency of financial markets. That speed and innovations lead to new products and features in financial markets.

14.3. Mutual Funds

Mutual funds, a well-known innovative financial vehicle, are a pool of collected funds that invested into various financial assets as stocks, bonds, and derivatives which allows diversification for their investors. In the world of agile and volatile markets, such diversification is crucial because it eliminates risks over different asset classes to ensure that the potential negative effects of exposure to specific unsystematic risk are lessened. Most investors from different backgrounds either do not have the enough time or the skill to properly diversify the investment on their own. For this reason, innovative investment vehicles like open-end mutual funds, closed-end mutual funds, and ETFs are developed. Goetzmann and Rouwenhorst (2005) define mutual funds as investments funds that provide investors opportunities to diversify the risks. Probably the biggest advantage of that type of investment is that the pooled fund assets are managed by investment professionals, who use innovative and sophisticated investment tools to eliminate some of the risk involved in investing in individual securities. Various investors comingle their funds in a pool to reach diversification, to save on the transaction fees and to work with a professional portfolio management team. These hired professional managers will conduct comprehensive market research and allocate commingled assets on behalf of the investors.

Every organized mutual fund has its own planned investment policy, and it is documented in the fund's prospectus. For example, bond mutual funds hold low risky fixed-income securities, while money market funds invest in short-term instruments. There are also some funds with a very specific mandate, such as some fixed-income mutual funds focus on investing primarily in Treasury bonds, while others only hold mortgage-backed securities (Bodie, Kane, & Marcus, 2018). Table 14.1 shows global mutual funds' total net assets in classes from 2010 to 2019.

Mutual funds have some advantages over other alternatives, that make it one of the attractive investment mechanisms.

- Portfolio diversification
- Professional management
- Cost efficiency
- Liquidity
- Data transparency.

Mutual funds are subject to investor-favoring regulations requiring that the use of leverage is limited, investment policies must be disclosed, the shares are

Table 14.1. Mutual Funds' Total Net Assets (Billion Dollars, Year-End).

Year	Total	Long-term Funds			Money Market Funds
		Equity	Hybrid	Bond	
2010	11.831,06	5596,17	842,20	2589,17	2803,52
2011	11.630,37	5212,79	883,98	2842,69	2690,92
2012	13.053,59	5938,75	1.032,46	3389,2	2693,17
2013	15.048,93	7762,56	1.284,70	3283,88	2717,81
2014	15.876,62	8313,99	1.379,20	3458,79	2724,64
2015	15.657,87	8149,61	1.341,47	3412,05	2754,74
2016	16.353,46	8577,27	1.399,87	3648,19	2728,14
2017	18.764,91	10305,2	1.547,05	4065,34	2847,31
2018	17.709,73	9227,7	1.383,96	4061,02	3037,04
2019	21.291,52	11376,2	1.578,97	4704,33	3632

Source: Adapted from Investment Company Institute, Mutual Fund Fact Book, 2020.

redeemable at any time, and so on. These advantages make investors to get in the market through these institutions. Mutual funds may be open-end or close-end.

14.3.1. Open-end Mutual Funds

Investors join open-end mutual funds by purchasing a predefined dollar amount of an open-end mutual fund and then they get a proportional ownership shares in the mutual fund. Through the life of the fund, the number of shares increase as new investors arrive and decrease as investors withdraw their funds. Open-end funds trade at the fund's net asset value (NAV), which is the difference between sum of all assets of the fund and then liabilities of the fund, then divided by the number of shares outstanding. While an investor decides to buy shares of an open-end mutual fund, he/she will transact at the next available NAV. Once investors decide to exit their investment in an open-end mutual fund, they have right to redeem their shares directly from the fund company. This is the why it is called "open-end."

14.3.2. Closed-end Mutual Funds

Another mutual-fund type, closed-end funds generally issue a fixed number of shares to investors through an initial public offering that are listed on a stock exchange or traded in the over-the-counter market. The market price of a closed-end fund share behaves like that of other publicly traded securities and is determined by demand and supply in the marketplace. The assets of a closed-end fund are professionally managed in accordance with the fund's investment objectives and policies, and may be invested in stocks, bonds, and other securities. Total assets of closed-end funds were \$278 billion at the end of 2019.

Closed-end mutual funds are similar to open-end funds with a few differences. The major difference is that while open-end mutual funds invest in popular areas like a diversified emerging markets fund, closed-end funds tend to invest in niche areas like small and specific emerging markets. Another difference is that a new purchase of shares in an open-end mutual fund will increase the number of shares outstanding because new shares are created, but a closed-end fund's number of shares remains unchanged. Investors who desire to purchase shares of a closed-end fund do not transact directly with the fund company but rather with other investors (although some closed-end funds may have stock repurchase programs). In contrast, investors who want to close their investment position in an open-end fund can simply redeem their shares from the fund company. The third difference is that when a closed-end fund investor wants to exit he/she cannot simply redeem his/her shares from the fund company. Instead, he/she must find another investor to buy their shares.

To sum up, through innovations in trading strategies, mutual fund companies better manage the funds of investors and create opportunity for diversification. Due to the fierce competition in the industry, these companies employ sophisticated investment patterns and algorithms to provide relative higher returns.

14.4. Exchange Traded Funds

ETFs are outgrowth of mutual funds which extend investors to buy and sell index portfolios. ETFs are innovative twist on the open-end mutual fund as they are exchange-traded. In other words, an ETF is a pooled investment vehicle which shares can be bought and sold through the day on a stock exchange at a market price. By the end of 2019, total net assets of the ETF industry worldwide amounted up to \$6.3 trillion, with the United States accounting for 70%, the largest in the world.

Nowadays, ETFs have become a popular alternative to mutual funds for investors. They are traded like stocks and are designed so that their prices reflect the value of the assets of the fund closely. ETFs have some advantages over conventional mutual funds. As mentioned above, mutual funds' NAV is disclosed once a day, so investors can trade these shares limited. However, closed-end funds' and ETFs' NAVs are calculated continuously throughout the day. Thus, retail investors buy and sell ETFs on the secondary market through a broker. On the other hand, regulations require ETFs disclose their holdings twice each day. That enables investors to have enough visibility into their underlying investments. Another advantage of ETFs is the management fees. Investors buy ETFs via brokers, rather than buying directly from the fund. Thus, the fund saves the marketing expenses and it results in lower fees and higher potential after-fee returns for investors.

Due to innovative trading strategies, there is a liquid secondary market of ETF shares. On average, 89% of the total daily activity in ETFs occurs on the secondary market. Moreover, ETF investment is used for hedging risks by informed traders. So, one consequence of this financial innovation is positive impact on market efficiency. [Huang, O'Hara, and Zhong \(2020\)](#) identify industry ETF, and find that informed investors can hedge industry risks through this vehicle.

14.5. Hedge Funds

Hedge funds are the similar investment vehicles to mutual funds as they both invest funds on behalf of their investors, but with some differences. They both commingle funds, provide professional portfolio management, achieve asset diversification, and so on. But hedge funds tend to trade in relatively inefficient markets, such as small, illiquid securities, complex derivative instruments, or securities of companies in financial distress or in the process of mergers. While seeking to buy undervalued securities, they invest in assets that are out of interest of most other investors. They are big user of financial derivatives in their investments for hedging, arbitrage, and speculation. Thus, only sophisticated, wealthy, and risk-loving investors can trade those non-public securities of hedge funds, where basically all investors can trade mutual funds. They take part in short sales, leveraged transactions, and other risky derivative strategies that are not available to mutual funds and pension funds which are restricted in the interests of their investors. Since hedge funds use leverage, long and short investment strategies, they are considered a risky alternative investment class. Due to the aggressive investment strategy, in a good year, big hedge funds can generate returns up 30%, where the average return expectation on conservative pension or insurance funds is around 5%–7%.

Moreover, hedge funds are relatively free of certain regulations as redemption of shares, daily calculation of NAV, disclosure of investment policies and strategies and others, that apply to mutual funds. This freedom gives hedge funds opportunities to develop unconventional, sophisticated and proprietary investment strategies.

A hedge fund manager usually uses innovative tools as derivatives to build a speculative or arbitrage position as an investment strategy. After the strategy has been set up, [Hull \(2018\)](#) proposes that fund manager should monitor the following:

- Evaluate the exposed risks,
- Differentiate among risks, which are acceptable and need to be hedged,
- Develop strategies through derivatives to hedge the unacceptable risks.

Hedge funds deploy long/short equity, dedicated short, distressed securities, convertible arbitrage, merger arbitrage, fixed-income arbitrage, emerging markets, global macro, and managed futures trading strategies for their investments. The assets under management of worldwide hedge funds increased from 1.4 trillion in 2010 to amounted to 3.19 trillion US dollars by the end of 2019.

Because of risky investment strategies of hedge funds, not too many financial advisors recommend these funds with clients compared to safer investment vehicles. Bad performing hedge funds' returns may shake investors' confidence, which means that the wrong investment strategy of such funds can leave their investors very exposed. Despite risky strategy, hedge funds will further evolve and develop because of investors' appetite for various strategies, and the fact that this appetite is dynamic. The latest innovative strategy, cryptocurrency hedge funds supports

and improves the flexibility, to be mainstream for institutional investors, and to-the-point relevance of hedge funds.

14.6. Financial Derivatives

Major innovative products – financial derivatives are securities that provide pay-offs which are determined by the prices of underlying assets such as stock or bond prices. So many different types of options, future contracts, swaps, and other derivatives are entered into the markets by fund managers, financial institutions, and corporate treasurers. The main purpose of derivatives is insuring against and benefiting from price fluctuations, taking exposure to underlying, transition between assets, and so on. These securities named as “derivatives” because their values derive from the prices of underlying assets. Financial institutions may invent new derivatives based on the needs of investors. Each derivative group has its own specific features and its price is based on these features, however general principles of the price being present value of future cash flows and the laws of demand and supply apply all derivative valuations.

14.6.1. Options’ Markets

An option gives the option holder the right (option writer the obligation) to buy or sell underlying asset by a certain date at the predetermined price (Kwok, 2008). Options trade on both over the counter (OTC) and organized markets. The OTC market has the advantage that the terms of the option contract – the maturity date, exercise price and number of shares committed – can be designed to the needs of the traders. Thus, the costs of establishing an OTC option contract are relatively high. Today, most options trade with standard contract sizes on organized exchanges. Those are uniformed by reasonable exercise prices and maturity dates for each listed option. Each stock option contract provides for the right to buy, except stock split. Options have nonlinear price dynamics because of the asymmetrical pattern of the rights and duties between the option holder and the option writer. In order to facilitate the trade, many options’ exchanges employ market makers. Each option has its own market maker who quotes both a bid and an offer price on that option. This mechanism ensures that buy and sell orders be operated at some price without any interruption. Therefore, market makers are important subjects and add liquidity to the market. These market makers make their profits from the bid-ask spread.

The clearing of trades is processed through The Option Clearing Corporation (OCC) guarantees that options’ writers will meet their obligations stated under the agreement of the contract. It also keeps a record of all short and long positions. Options’ exercising is processed through a complex software system. The process starts with an investor orders a broker to exercise an option, then broker notifies the OCC member that clears its trades. The process goes on step-by-step. Financial markets authorities regulate options’ markets in different ways. In the United States, both the exchange where trade occurs and OCCs have rules to govern the market. In addition, there are both federal and state-level regulatory

authorities. Financial Conduct Authority in UK, Australian Securities and Investments Commission in Australia, Financial Services Agency in Japan, and the Capital Markets Board of Turkey in Turkey, etc. regulate the options markets in the countries. Additionally, the options markets regulate themselves. Investors have a high level of confidence in the way the market is run.

Besides organized exchanges, at the over-the-counter derivatives, market financial engineers have created nonstandard products for special needs. These products are called exotic options. Such complex products are important to derivatives' dealers because they are generally much more profitable than plain vanilla products. Being a product of financial engineering, exotic options are created for several reasons. The main purpose is providing genuine hedging for underlying asset. Sometimes there are tax, legal, or regulatory concerns where fund managers, and/or financial institutions find such exotic products attractive. Other motives include designing the products for speculation market variables. Popular types of exotic options include Gap Options, Compound Options, Forward Start Options, Chooser Options, Cliquet options among others. The total global size of Options markets has risen from 11.12 billion contracts in 2010 to 15.23 billion contracts by the end of 2019.

14.6.2. Futures Market

Futures are exchange-traded contracts providing holder a right to buy or sell a certain amount of an underlying asset at a specified price and date. In other words, the futures contract considers delivery of a commodity or another asset at a specified delivery date, for an agreed price. An example is a crude oil futures contract in which parties agree to deliver a certain barrel of crude oil at a certain price in the future. Details of the contracts are very important, such that both sides must know when the underlying asset will be delivered, where and how the delivery takes place and the costs associated with them. Trade in futures markets is a bit complex and conducted through clearinghouses. It guarantees the performance of the parties on each transaction. The markets in the United States are regulated federally by the Commodity Futures Trading Commission, which ensures that prices are disclosed to the public and that futures traders report their outstanding positions, as well as, the Commission issues licenses to individuals and firms who offer services in futures trading. In modern financial markets, very few futures contracts' underlying assets are delivered. Futures' traders usually get offsetting contracts to close out their positions before the delivery period is reached.

A futures contract is a standardized product traded on an organized exchange. A predefined range of delivery dates is usually specified. It is settled daily and usually closed out prior to maturity. However, a forward contract is traded in the over-the-counter market thus does not have interim partial payment provision and there is no standard contract size or standard delivery arrangements. A single delivery date is usually specified, and the contract is usually held to the end of its life and then settled (Hull, 2018).

Trading in an organized exchange supports price discovery, supports transparency, and provides anonymity of trade counterparties. In all trades, the

clearinghouse becomes the counterparty, so the credit risk is standardized (Heckinger, 2013). Being a strong tool for hedging, futures market has higher volume. Total number of contracts worldwide have risen from 11.30 billion in 2010 to 19.24 billion in 2019. The details are given in Table 14.2.

14.6.3. Swaps

Being a popular product of financial engineering, a swap is an exchange contract of financial assets or cash flows between two parts for some period. The contract stipulates the dates when the cash flows will be paid and how they will be calculated. There is interest rate, basis, currency, inflation, and other derived types of swap in the market. Interest rate swap is about exchanging floating rate (LIBOR most of the time) payment with fixed rate payment or vice versa for a certain time. Currency swaps are contractual agreements to deliver one currency in exchange for another to hedge currency risk, however they bear default risk (Ross, Westerfield, Jaffe, & Jordan, 2018). Since the trade volumes are high, most of the participants in the swaps market are large financial institution rather than individuals. It is an over-the-counter market agreement, so they are not regulated and not traded in organized secondary market.

14.6.4. Weather Derivatives

Another innovative product in finance is weather derivatives. Many weather-sensitive industries as airlines, agricultural and utility companies as well as tourism recreational service providers face weather risk in their daily businesses. Finance professionals use cross hedge to mitigate losses caused by severe weather changes. Such developed weather derivatives are innovative financial vehicles whose payoffs

Table 14.2. Global Size of Futures’ Markets (Billions).

Years	Asia	North America	Europe	Latin America	Other	World
2010	4.66	2.80	3.06	0.57	0.22	11.30
2011	4.60	3.09	3.58	0.63	0.23	12.12
2012	4.21	2.70	3.21	0.65	0.23	11.01
2013	4.78	3.11	3.30	0.70	0.25	12.14
2014	4.56	3.22	3.38	0.66	0.32	12.14
2015	6.18	3.27	3.73	0.74	0.56	14.48
2016	6.70	3.63	4.14	0.86	0.56	15.90
2017	5.58	3.72	3.91	1.14	0.50	14.85
2018	6.58	4.32	4.16	1.73	0.39	17.18
2019	7.66	4.26	3.96	2.85	0.51	19.24

Source: Adapted from Futures Industry Association.

depend on the value of underlying weather index. The underlying weather index can be adverse temperature, wind, snowfall or humidity, or any other weather variable (Alexandridis & Zapranis, 2013). For example, for unforeseeable conditions, utility companies use weather derivatives to hedge the cost of energy they buy. The energy they sell is used for cooling or heating, and it is highly affected by weather patterns. Airline companies use weather derivatives to hedge cancellation risk of their flights in windy weathers. Agriculture firms have risk of higher temperature or precipitation which are hedged by weather derivatives. Being innovative products of financial engineering, derivatives evolve, improve, and offer tailored solutions to the specific needs of investors and traders. They will be valuable and critical for finance sector amid artificial intelligence era.

14.7. Blockchain in Finance

Blockchain, the decentralized and distributed replicated ledger technology, offers new opportunities in finance. These technologies are used in banking industry to reduce costs and increase efficiency. Cryptocurrencies use blockchain technology to keep records of transactions. Over the past years, they have exhibited rapid development and distribution. They have some advantages over fiat currency as being free of transaction costs, faster transfer, being decentralized and others. Besides being a medium of exchange, cryptocurrencies are an investment alternative nowadays. Kuo Chuen, Guo, and Wang (2017) find that because of lower correlation between traditional assets and cryptocurrencies, cryptocurrencies are good option to diversify portfolio risks and the average daily return of most cryptocurrencies is higher than that of traditional investments.

Bitcoin investment has become popular in the last years. Popularity of bitcoin comes from various reasons, such as flexibility, being fast, relatively lower transaction fees, being decentralized, and so on. Transactions occur immediately without any intermediaries, and verification is decentralized to whole network. Other than bitcoin, there are some other alternative cryptocurrencies, shortly altcoins. These cryptocurrencies are traded through software, online wallets, applications, vending machines, and mined. Blockchain technologies do not stop innovations in finance. In 2019, Facebook announced its cryptocurrency Libra and the works go on. These applications, however, have some legal drawbacks as taxation issues, being used in financing illegal activities, control by central banks and so on. Having these drawbacks controlled, blockchain technologies will increase efficiency in the finance sector.

14.8. Conclusion

Financial industry has been adopting innovations faster, due to it generates return or eliminates risk that favor investors. In this chapter, we introduce general innovations and their impact on the finance sector. We start with describing high-frequency trade process, and its features. Then, we explain innovative investments vehicles of mutual funds, ETFs, and hedge funds. Financial derivatives are other important products in finance. We describe options markets, futures markets with

contract sizes. The chapter also covers over-the-counter financial tools as swaps and weather derivatives. The last part is about blockchain technologies in finance, especially cryptocurrency market. The market is growing fast with higher financial risks.

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